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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/776,591	02/12/2004	Kazuya Fukuhara	03180.0353	3478

22852 7590 02/03/2009

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EXAMINER	
THOMAS, MIA M	

ART UNIT	PAPER NUMBER
2624	

MAIL DATE	DELIVERY MODE
02/03/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/776,591	FUKUHARA, KAZUYA	
	Examiner	Art Unit	
	Mia M. Thomas	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 November 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 November 2008* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 18 November 2008 has been entered.

Response to Amendment

2. This Office Action is responsive to applicant's remarks received on 18 November 2008. By this amendment, applicant amends claims 1, 8 and 15. Claims 1-20 remain pending in this application. A complete response to applicant's remarks follows herewith.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Annex IV, reads as follows (see also MPEP 2106):

> Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when employed as a computer component. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data.
>
> When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. Compare In re Lowry, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) and Warmerdam, 33

> F.3d at 1360-61, 31 USPQ2d at 1759 (claim to computer having a specific data structure stored in memory held statutory product-by-process claim) with Warmerdam, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory).
>
> In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. See Lowry, 32 F.3d at 1583-84, 32 USPQ2d at 1035.

4. Claims 15-20 are rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. Supreme Court precedent[1] and recent Federal Circuit decisions[2] indicate that a statutory "process" under 35 U.S.C. 101 must (1) be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter (such as an article or material) to a different state or thing. While the instant claim recites a series of steps or acts to be performed, the claim neither transforms underlying subject matter nor is positively tied to another statutory category that accomplishes the claimed method steps, and therefore does not qualify as a statutory process. In order for a process to be "tied" to another statutory category, the structure of another statutory category should be positively recited in a step or steps significant to the basic inventive concept, and NOT just in association with statements of intended use or purpose, insignificant pre or post solution activity, or implicitly.

The Applicant has provided no explicit and deliberate definitions of "receiving", "analyzing" or "responding" to limit the steps to manufacture a semiconductor device.

The following is a mere suggestion by the Examiner that may overcome the aforementioned rejection of Claims 15-20, specifically independent claim 15. It is important however that the

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[1] *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876).

[2] *In re Bilski*, 88 USPQ2d 1385 (Fed. Cir. 2008).

applicant and/or applicant's representative ensure that any and all amendments are indeed supported by the original disclosure.

> 15. (Currently amended) A method for manufacturing a semiconductor device **using a processor (or computer) to perform the steps of:**
> executing an inspection processing of an exposure tool including:
> coating a surface of an inspection target substrate with an inspection resist film;
> placing a plurality of imaging components deviating from an optical conjugate plane of a surface of the inspection resist film;
> generating a plurality of inspection patterns of the inspection resist film having a plurality of openings, by projecting exposure beams output from a plurality of effective light sources onto the inspection resist film via the imaging components, each of the openings corresponding to each of the effective light sources, each of the inspection patterns corresponding to each of the imaging components, the effective light sources being placed on a different optical conjugate plane than the surface of the resist film;
> measuring one of the inspection patterns as a reference image, and processing the reference image so as to provide reference image data; and
> determining an abnormal inspection image by measuring inspection images of the inspection patterns and comparing a plurality of inspection image data provided by processing the inspection images with the reference image data;
> correcting the exposure tool by acquiring a type of defect from the abnormal inspection image when the abnormal inspection image is determined to occur; coating a semiconductor substrate with a manufacturing resist film;
> loading a manufacturing photomask and the semiconductor substrate to the exposure tool, and
> subjecting the semiconductor substrate to a manufacturing process of a semiconductor device by delineating the manufacturing resist film using the manufacturing photomask.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1, 3, 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pierrat (US 6,272,236) in combination with Hagiwara (US 5,838,433), Kazakevich (US 2003/0042493 A1) and Kobayashi et al (US 6064484 A).

Regarding Claim 1: (Currently amended) Pierrat teaches an inspection method for an illumination optical system of an exposure tool ("An improved technique for inspecting photomasks employs simulated images of the resist pattern." at abstract, also refer to column 1, line 7), comprising:

coating a surface of an exposure target substrate with a resist film ("The pattern is transferred to a photoresist coating on the wafer surface, forming a resist pattern." at column 1, line 32);

Hagiwara teaches placing a plurality of imaging components deviating from an optical conjugate plane of a surface of the resist film (Refer to Figure 37; also column 27,line 65; "FIG. 37 is a perspective view of the present embodiment. FIG. 37 facilitates understanding the positional relations among the light detecting surfaces of the sixteen photoelectric conversion elements disposed on the four pupil-conjugate planes in FIG. 31A.");

generating a plurality of inspection patterns of the resist film having a plurality of openings, by projecting exposure beams output from a plurality of effective light sources onto the resist film via the imaging components (Refer to column 30, line 56, specifically, RE: Figure 40, "Similar members to those in FIG. 31A are denoted by the same reference numerals, and the detailed description thereof is omitted herein. The objective lenses are located at positions where the direct reflected light or the direct transmitted light is not incident; for example, they are disposed

at positions in plane symmetry with respect to the pattern-scribed surface of the reticle R as in the eighth embodiment.")

Kazakevich teaches each of the openings corresponding to each of the effective light sources, each of the inspection patterns corresponding to each of the imaging components ("LED array 86 includes a plate 80 having an array of openings 96. Each LED 94 is located within an opening 96. A second plate 82 similarly includes a lens array 88 that corresponds to each of the LEDs 94. Each lens 98 is located within an opening 98. A third plate 84 has a set of fiber optic lines 100 positioned within aperture array 90. Each fiber line 100 is aligned with a corresponding one of lenses 98." at paragraph [0062]),

the effective light sources being placed on a different optical conjugate plane than the surface of the resist film ("Other embodiments include having various lens configurations. These embodiments include a lens for receiving light from the semiconductor source. The semiconductor light source is optically aligned with the lens and the lens is optically aligned with the fiber optic line. The semiconductor light source is positioned in a first optical conjugate plane from the lens and the fiber optic line is positioned in a second optical conjugate plane from the lens." at paragraph [0011]; further at paragraph [0063])

Kobayashi teaches measuring one of the inspection patterns as a reference image, and processing the reference image so as to provide reference image data (Refer to Figure 2, numeral T3, T4, T5, T6 via numeral S8);

measuring inspection images of the inspection patterns, and processing the inspection images with the reference image data so as to provide a plurality of inspection image data(Refer to Figure 2, numeral S4, S6, 7a and 7b via numeral S8);

and determining an abnormal inspection image by comparing the inspection image data with the reference image data (Refer to Figure 2, numeral S9; "At next step S9, a die-to-die (or plate-to-plate) comparison inspection is performed. A die-to-database inspection may also be carried out at this step.")

All the claimed elements were known in the prior art and one skilled in the art could have combined the elements as taught by the combination of Pierrat, Hagiwara, Kazakevich and Kobayashi as claimed, by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

Pierrat, Hagiwara, Kazakevich and Kobayashi are combinable because they are in the same field of semiconductor inspection, optics measurements and light reflectance of a mask or optical element. (See classification, abstract and title of each invention).

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to place the effective light sources on different conjugate planes, specifically ones other than the resist film.

The suggestion/motivation for doing so would have been "the solid-state light source concentrates light in a small area while providing high luminous emittance. Also, the semiconductor light source more efficiently couples light energy into an optical element (e.g., optic fiber)." at paragraph [0014], Kazakevich.

Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Pierrat, Hagiwara, Kazakevich and Kobayashi to obtain the specified claimed elements of Claim 1.

Regarding Claim 3: (Original) Pierrat teaches the abnormal inspection image occurs due to a defect including at least one of dust, a scratch in an illumination optical system which forms the effective light source, and an aberration of the illumination optical system ("Mask fabrication defects have a variety of causes. Such causes include, but are not limited to, defects in the original substrate, introduction of particulate matter during fabrication, scratches, or improper processing. In an attempt to minimize the number of defects introduced during wafer processing, photomasks are inspected after they are created and before they are used to pattern the wafers." at column 1, line 44).

Regarding Claim 4 (Original)**:** Hagiwara teaches the imaging components are a plurality of pinholes provided in an opaque film ("A pinhole 139 provided on the optical axis AX1 of the objective lens 118 is conjugate with the circuit-scribed surface 109 of reticle 108, so that an image of the pinhole 139 can be projected onto the circuit-scribed surface 109 of reticle 108 by a lens 138, a one-dimensional deflecting means 121, and the objective lens 118." at column 21, lines 51+).

7. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pierrat (US 6,272,236) in combination with Hagiwara (US 5,838,433), Kazakevich (US 2003/0042493 A1) and Kobayashi et al (US 6064484 A), and further in view of Hiroi et al (US 6,373,054 B2).

Regarding Claim 2: (Previously presented) Pierrat, Hagiwara, Kazakevich and Kobayashi in combination teach all the claimed elements as rejected above. Pierrat, Hagiwara, Kazakevich and Kobayashi in combination do not specifically/expressly teach the reference image data and the inspection image data are at least one of a brightness of the inspection image of the inspection pattern and a shape of the inspection pattern.

Hiroi teaches the reference image data and the inspection image data include at least one of a brightness of the inspection image of the inspection pattern and a shape of the inspection pattern. ("From the strength (brightness) of a digital image signal correlative to the yielded secondary electrons detected by the sensor 11 in a place coinciding with the outside shape of a pattern (material A or B)..." at column 21, line 52).

Pierrat, Hagiwara, Kazakevich, Kobayashi and Hiroi are combinable because they are in the same field of semiconductor inspection, optics measurements and light reflectance of a mask or optical element. (See classification, abstract and title of each invention).

All the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to measure/calculate the reference image data and the inspection image data are at least one of a brightness of the inspection image of the inspection pattern and a shape of the inspection pattern.

The motivation/suggestion for doing so would have been "to obtain a high-contrast signal representing a physical property by using electrons obtained efficient from the object making it possible to inspect a minute defect at a high speed and with high reliability." at column 1, line 58+, Hiroi.

Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Pierrat, Hagiwara, Kazakevich, Kobayashi and Hiroi '054 to obtain the specified claimed elements of Claim 2.

Regarding Claim 6 (Original): Hiroi teaches wherein the pinholes implement a diffraction grating having a translucent film and a transparent portion arranged in a grid pattern (Refer to Figure 16, numeral 48 and 49; "...a potential providing device 19 such as a grid disposed between the objective lens 18 and the wafer (object) 20, a wafer holder 21 for holding the wafer 20 mounted thereon..." at column 24, line 67).

Regarding Claim 7 (Original): Hagiwara teaches the reference image data and the inspection image data further include a variation of a center position between at least one of the inspection patterns formed by a zeroth-order diffraction beam (Refer to Figures 3a and 3b, also at column

7, line 58) of the diffraction grating and an outer edge formed by a plurality of first-order diffraction beams, and a size of the outer edge (Refer to column 8, line 27).

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pierrat (US 6,272,236) in combination with Hagiwara (US 5,838,433), Kazakevich (US 2003/0042493 A1), Kobayashi et al (US 6064484 A) and further in view of Schulze et al. (US 7,221,788 B2).

Regarding Claim 5: Pierrat, Hagiwara, Kazakevich and Kobayashi in combination teach all the claimed elements as rejected above. Pierrat, Hagiwara, Kazakevich and Kobayashi in combination do not specifically/expressly teach imaging components are a plurality of lenses in a lens.

Schulze teaches the imaging components are a plurality of lenses in a lens array ("To record an image of the pattern formed on the mask, the mask is irradiated with light from one side and an image of the light transmitted through the mask is recorded using a sensor mounted on the other side. A lens projection system is used to yield a sharp image." at column 9, line 57).

Pierrat, Hagiwara, Kazakevich, Kobayashi and Schulze are combinable because they are in the same field of semiconductor defect detection.

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to provide a plurality of lenses in a lens array as the imaging components for this invention.

The suggestion/motivation for doing so would have been to create a more efficient defect inspection tool. Utilizing a plurality of imaging components would create multiple positions to calculate and determine artifact and defects in an inspection method/technique. Further at column 9, line 60, Schulze discloses that the use of a plurality of lenses in a lens array yields a sharper image. The sharper image would thus make the results of the mask inspection more effective and useful.

Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Pierrat, Hagiwara, Kazakevich, Kobayashi and Schulze to obtain the specified claimed elements of Claim 5.

9. Claims 8, 10, 11, 13, 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada et al (US 6,222,195 B1) in combination with Hagiwara (US 5,838,433), Kazakevich (US 2003/0042493 A1) and Kobayashi et al (US 6064484 A).

Regarding Claim 8: (Currently amended) Yamada teaches a processor for inspecting an illumination optical system of an exposure tool (Refer to Figure 1; "A method of detecting deficiency of an aperture used in a charged-particle-beam exposure process employing at least two exposure columns is disclosed..." at abstract),

a data input module configured to acquire a reference image and inspection images of a plurality of inspection patterns of a resist film having a plurality of openings(Refer to Figure 1, numeral 152 via numeral 160; also Refer to Figures 2a and 2b, Figure 2a resembling the acquisition of the image and Figure 2b, resembling the reference image and inspection image with a plurality of inspection patterns);

Hagiwara teaches the inspection patterns obtained by projecting exposure beams output from a plurality of effective light sources onto the resist film coated on a surface of an exposure target substrate by a plurality of imaging components ("light scanning means for condensing the laser beam in a first region of the first surface of the substrate and irradiating the first region with the laser beam, said light scanning means continuously moving the first region in a one-dimensional direction in the pattern-scribed surface of the substrate..." at column 3, line 1; "Namely, the present invention can be applied to the conventional reticles of circuit pattern of chromium shielding film, and halftone reticles in which the circuit pattern is scribed only by phase shifter using an optically transparent thin film." at column 32, line 33).

the imaging components placed so as to deviate from an optical conjugate plane of the surface of the resist film (Refer to Figure 37; also column 27,line 65; "FIG. 37 is a perspective view of the present embodiment. FIG. 37 facilitates understanding the positional relations among the light detecting surfaces of the sixteen photoelectric conversion elements disposed on the four pupil-conjugate planes in FIG. 31A.");

Kazakevich teaches each of the openings corresponding to each of the effective light sources, each of the inspection patterns corresponding to each of the imaging components ("LED array 86 includes a plate 80 having an array of openings 96. Each LED 94 is located within an opening 96. A second plate 82 similarly includes a lens array 88 that corresponds to each of the LEDs 94. Each lens 98 is located within an opening 98. A third plate 84 has a set of fiber optic lines 100 positioned within aperture array 90. Each fiber line 100 is aligned with a corresponding one of lenses 98." at paragraph [0062]),, the effective light sources being placed on a different optical conjugate plane than the surface of the resist film; ("Other embodiments

include having various lens configurations. These embodiments include a lens for receiving light from the semiconductor source. The semiconductor light source is optically aligned with the lens and the lens is optically aligned with the fiber optic line. The semiconductor light source is positioned in a first optical conjugate plane from the lens and the fiber optic line is positioned in a second optical conjugate plane from the lens." at paragraph [0011]; further at paragraph [0063])

Kobayashi teaches an image processing module configured to calculate reference image data and inspection image data from the reference image and the inspection images, respectively (Refer to Figure 1, numeral 9 and numeral 17)

and a determination module configured to compare the inspection image data with the reference image data, so as to determine whether the inspection image data is abnormal (Refer to Figure 2, numeral S9)

Yamada, Hagiwara, Kazakevich and Kobayashi are combinable because they are in the same field of semiconductor inspection, optics measurements and light reflectance of a mask or optical element. (See classification, abstract and title of each invention).

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to place the effective light sources on different conjugate planes, specifically ones other than the resist film.

The suggestion/motivation for doing so would have been "the solid-state light source concentrates light in a small area while providing high luminous emittance. Also, the semiconductor light source more efficiently couples light energy into an optical element (e.g., optic fiber)." at paragraph [0014], Kazakevich.

Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Yamada, Hagiwara, Kazakevich and Kobayashi to obtain the specified claimed elements of Claim 8.

Regarding Claim 10: (Original) Yamada teaches the abnormal inspection image being due to a defect including at least one of dust, a scratch in an illumination optical system ("A difference between the two waveforms indicates that either one of the mask patterns 13A or 13B has a defect. In this case, it is possible to rely on a visual inspection to determine which one of the mask patterns 13A and 13B has the defect." at column 12, line 23) which forms the effective light source, and an aberration of the illumination optical system ("A subsequent inspection after the replacement of one of the masks will be repeated until no difference is detected between the two signal waveforms." at column 12, line 30).

Regarding Claim 11: (Original) Yamada teaches wherein the imaging components are a plurality of pinholes provided in an opaque film (Refer to Figures 10a and 10b; "For the pattern inspection of this embodiment, a glass board coated with a thin metal layer (e.g., Cr wafer) is preferably used, and a pattern is transferred onto the metal layer by etching. This is because a sharper pattern than a resist pattern can be formed on the metal layer on the glass board to

achieve more reliable inspection by using the comparison-inspection device." at column 16, line 59).

Regarding Claim 13: (Original) Yamada teaches the pinholes configure a diffraction grating having a translucent film and a transparent portion arranged in a grid pattern (Refer to Figure 6, S11-S19, specifically, numeral S13).

Regarding Claim 14: (Original) Yamada teaches reference image data and the inspection image data further include a variation of a center position between at least one of the inspection patterns formed by a zeroth-order diffraction beam of the diffraction grating and an outer edge formed by a plurality of first-order diffraction beams, and a size of the outer edge (Refer to Figure 6, numeral S16; "The beam having passed through the block mask 120 passes through the blanking 125, is converged by the fourth lens 126, deflected to a center of a sub-field of about a 100-.mu.m square by the main deflector 133, and deflected within this sub-field by the sub deflector 134." at column 2, line 33).

10. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada et al (US 6,222,195 B1) in combination with Hagiwara (US 5,838,433), Kazakevich (US 2003/0042493 A1), Kobayashi et al (US 6064484 A) and further in view of Hiroi et al (US 6,373,054 B2).

Regarding Claim 9: (Previously presented) Yamada, Hagiwara, Kazakevich and Kobayashi in combination teach all the claimed elements as rejected above. Yamada, Hagiwara, Kazakevich and Kobayashi in combination do not specifically/expressly teach the reference image data and

the inspection image data are at least one of a brightness of the inspection image of the inspection pattern and a shape of the inspection pattern.

Hiroi teaches the reference image data and the inspection image data include at least one of a brightness of the inspection image of the inspection pattern and a shape of the inspection pattern. ("From the strength (brightness) of a digital image signal correlative to the yielded secondary electrons detected by the sensor 11 in a place coinciding with the outside shape of a pattern (material A or B)..." at column 21, line 52).

Yamada Hagiwara, Kazakevich, Kobayashi and Hiroi are combinable because they are in the same field of semiconductor inspection, optics measurements and light reflectance of a mask or optical element. (See classification, abstract and title of each invention).

All the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to measure/calculate the reference image data and the inspection image data are at least one of a brightness of the inspection image of the inspection pattern and a shape of the inspection pattern.

The motivation/suggestion for doing so would have been "to obtain a high-contrast signal representing a physical property by using electrons obtained efficient from the object making it possible to inspect a minute defect at a high speed and with high reliability." at column 1, line 58+, Hiroi.

Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Yamada Hagiwara, Kazakevich, Kobayashi and Hiroi to obtain the specified claimed elements of Claim 9.

11. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada et al (US 6,222,195 B1) in combination with Hagiwara (US 5,838,433), Kazakevich (US 2003/0042493 A1), Kobayashi et al (US 6064484 A) and further in view of Schulze et al. (US 7,221,788 B2).

Regarding Claim 12: (Previously presented) Yamada, Hagiwara, Kazakevich and Kobayashi in combination teach all the claimed elements as rejected above. Yamada, Hagiwara, Kazakevich and Kobayashi in combination do not specifically/expressly teach the imaging components are a plurality of lenses in a lens array.

Schulze teaches the imaging components are a plurality of lenses in a lens array ("To record an image of the pattern formed on the mask, the mask is irradiated with light from one side and an image of the light transmitted through the mask is recorded using a sensor mounted on the other side. A lens projection system is used to yield a sharp image." at column 9, line 57).

Yamada Hagiwara, Kazakevich, Kobayashi and Schulze are combinable because they are in the same field of semiconductor defect detection.

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to provide a plurality of lenses in a lens array as the imaging components for this invention.

The suggestion/motivation for doing so would have been to create a more efficient defect inspection tool. Utilizing a plurality of imaging components would create multiple positions to calculate and determine artifact and defects in an inspection method/technique. Further at column 9, line 60, Schulze discloses that the use of a plurality of lenses in a lens array yields a sharper image. The sharper image would thus make the results of the mask inspection more effective and useful.

Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Yamada, Hagiwara, Kazakevich, Kobayashi and Schulze to obtain the specified claimed elements of Claim 12.

Response to Arguments

12. Applicant's arguments filed 18 November 2008 have been fully considered and a complete response to those remarks is provided below.

Summary of Remarks: A. At page 10, "Pierrat fails to teach or suggest at least this feature-"wherein each opening corresponds to one of the effective light sources, and each inspection pattern corresponds to one of the imaging components.

Examiner's Response:

B. With respect to the rejection(s) of claim 1, regarding the aforementioned argument regarding Pierrat not teaching the newly amended claim limitation as stated above at section A of the response to applicant's arguments under 35 U.S.C 103 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of the combination of the teachings of Pierrat in combination with Hagiwara, Kazakevich and Kobayashi. See the new rejection above. Each of the prior art references teaches/suggests the claimed elements as currently amended herewith. The Examiner maintains that the newly rejected claims under the combination of Pierrat in combination with Hagiwara, Kazakevich and Kobayashi more than fairly teaches the newly rejected claim 1.

Summary of Remarks:

C. At page 12, Hagiwara fails to teach at least "each opening corresponds to one of the effective light sources, and each inspection pattern corresponds to one of the imaging components."

Examiner's Response:

D. The Examiner respectfully disagrees. However, the Examiner maintains that Hagiwara and Kazakevich in combination teach the limitation of "each opening corresponds to one of the effective light sources, and each inspection pattern corresponds to one of the imaging components." Hagiwara does in fact teach a light source (emitting light source) and the skilled artisan at the time that the invention was made, could have also added multiple emitting light sources to the overall inspection (system/method of inspection) and the addition of the light

source would have been obvious in view of simple substitution since that substitution would have yielded predictable results.

Similarly, Kazakevich teaches a light emitting device which supports the limitation of "each opening corresponds to one of the effective light sources, and each inspection pattern corresponds to one of the imaging components." ("LED array 86 includes a plate 80 having an array of openings 96. Each LED 94 is located within an opening 96. A second plate 82 similarly includes a lens array 88 that corresponds to each of the LEDs 94. Each lens 98 is located within an opening 98. A third plate 84 has a set of fiber optic lines 100 positioned within aperture array 90. Each fiber line 100 is aligned with a corresponding one of lenses 98." at paragraph [0062]). (See rejection above).

The combination of the teachings of Hagiwara and Kazakevich, specifically with regards to this newly amended limitation teaches the claimed elements as rejected above. Therefore, the previous rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of the combination of the teachings of Pierrat in combination with Hagiwara, Kazakevich and Kobayashi.

Summary of Remarks:

E. At pages 14-18, with regards to claims 2-7; "Applicant's respectfully request that the Examiner withdraw the rejection of claims 2-7" (in summary, at each argument).

Examiner's Response:

F. With respect to the rejection(s) of claims 2-7 under 35 U.S.C 103, have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection for each of claims 2-7. See newly rejected claims above.

Summary of Remarks:

G. At pages 14-18, with regards to claims 2-7; "Applicant's respectfully request that the Examiner withdraw the rejection of claims 2-7" (in summary, at each argument).

Examiner's Response:

H. With respect to the rejection(s) of claims 2-7 under 35 U.S.C 103, have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection for each of claims 2-7. See newly rejected claims above.

Summary of Remarks:

I. At pages 18-22 with regards to claims 8-14 "Applicant's respectfully request that the Examiner withdraw the rejection of claims 2-7" (in summary, at each argument).

Examiner's Response:

J. With respect to the rejection(s) of claims 8-14 under 35 U.S.C 103, have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection for each of claims 8-14 has been forwarded

herewith. See newly rejected claims above. A similar response to applicant's arguments regarding the claimed limitations of independent Claim 8 (specifically with reference to newly amended claim limitation of "each opening corresponds to one of the effective light sources, and each inspection pattern corresponds to one of the imaging components.") is newly rejected under the combination of the teachings of Yamada in combination with Hagiwara, Kazakevich and Kobayashi.

With regards to the argument that Noguchi fails to cure the above noted deficiencies of Yamada. The Examiner agrees, however upon further consideration, independent claim 8 is newly rejected. See new rejection above.

Regarding Hagiwara, Hagiwara does in fact teach a light source (emitting light source) and the skilled artisan at the time that the invention was made, could have also added multiple emitting light sources to the overall inspection (system/method of inspection) and the addition of the light source would have been obvious in view of simple substitution since that substitution would have yielded predictable results.

Similarly, Kazakevich teaches a light emitting device which supports the limitation of "each opening corresponds to one of the effective light sources, and each inspection pattern corresponds to one of the imaging components." ("LED array 86 includes a plate 80 having an array of openings 96. Each LED 94 is located within an opening 96. A second plate 82 similarly includes a lens array 88 that corresponds to each of the LEDs 94. Each lens 98 is located within an opening 98. A third plate 84 has a set of fiber optic lines 100 positioned within

aperture array 90. Each fiber line 100 is aligned with a corresponding one of lenses 98." at paragraph [0062]). (See rejection above).

The combination of the teachings of Hagiwara and Kazakevich, specifically with regards to this newly amended limitation teaches the claimed elements as rejected above. Therefore, again the previous rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of the combination of the teachings of Yamada in combination with Hagiwara, Kazakevich and Kobayashi.

K. Applicant's arguments, see page 23-26, with respect to Claims 15-20 have been fully considered and are persuasive. The rejection of claims 15-20 under 35 U.S.C.103 (a) has been withdrawn.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mia M. Thomas whose telephone number is (571)270-1583. The examiner can normally be reached on Monday-Thursday 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on 571-272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mia M Thomas/

Examiner, Art Unit 2624

/Vikkram Bali/

Supervisory Patent Examiner, Art Unit 2624